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DATAMATION

Scientific Computing

WITH:
COMPUTING AT NASA/AMES

CORPORATE DOLLARS ON CAMPUS

SUPERCOMPUTER FUNDING SQUEEZE

PLUS:
INFORMATION RESOURCE MANAGEMENT

HOW TO TAKE A TECHNOLOGY SNAPSHOT

DATAMATION

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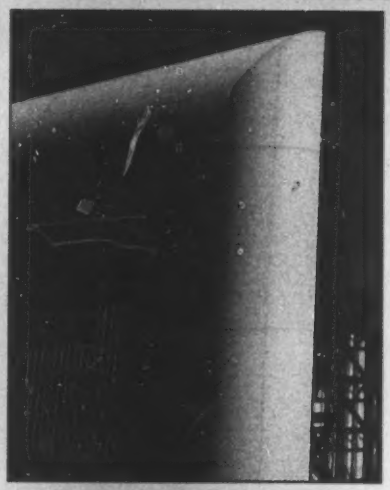

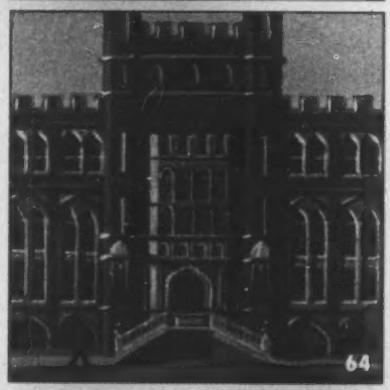

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Cover art by Richard F. Voss/IBM Research. High-resolution rendering of a fragment of the Mandelbrot set for complex quadratic iteration (B.B. Mandelbrot, *The Fractal Geometry of Nature*, 1982). Copyright 1987 R.F. Voss.

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Editorial

An Officer, a Gentleman, and an MIS Specialist

Many a vendor has proclaimed this the "year of the customer." But in courting the customer, many a vendor has failed to adopt a new marketing and sales approach to what is indeed a new MIS environment.

Today's top MIS executives are businessmen first and information processing specialists second. They know that technology and product are not in themselves a solution.

We heard this loud and clear as we sat with six top MIS managers two weeks ago in our New York offices. While we'll share much of that discussion with you in an upcoming issue, the message they hammered home signals a major change within leading MIS management. It was best said by Rear Admiral Harry T. Quast, director of the information systems division in the Office of the Chief of Naval Operations: "I am first and foremost an officer of the U.S. Navy. My 'bottom line' or 'P&L' mission is fleet readiness. My specialty toward meeting that mission happens to be information systems."

Admiral Quast sets the specs. Vendors vie to meet his needs. But fleet readiness is his first and foremost goal.

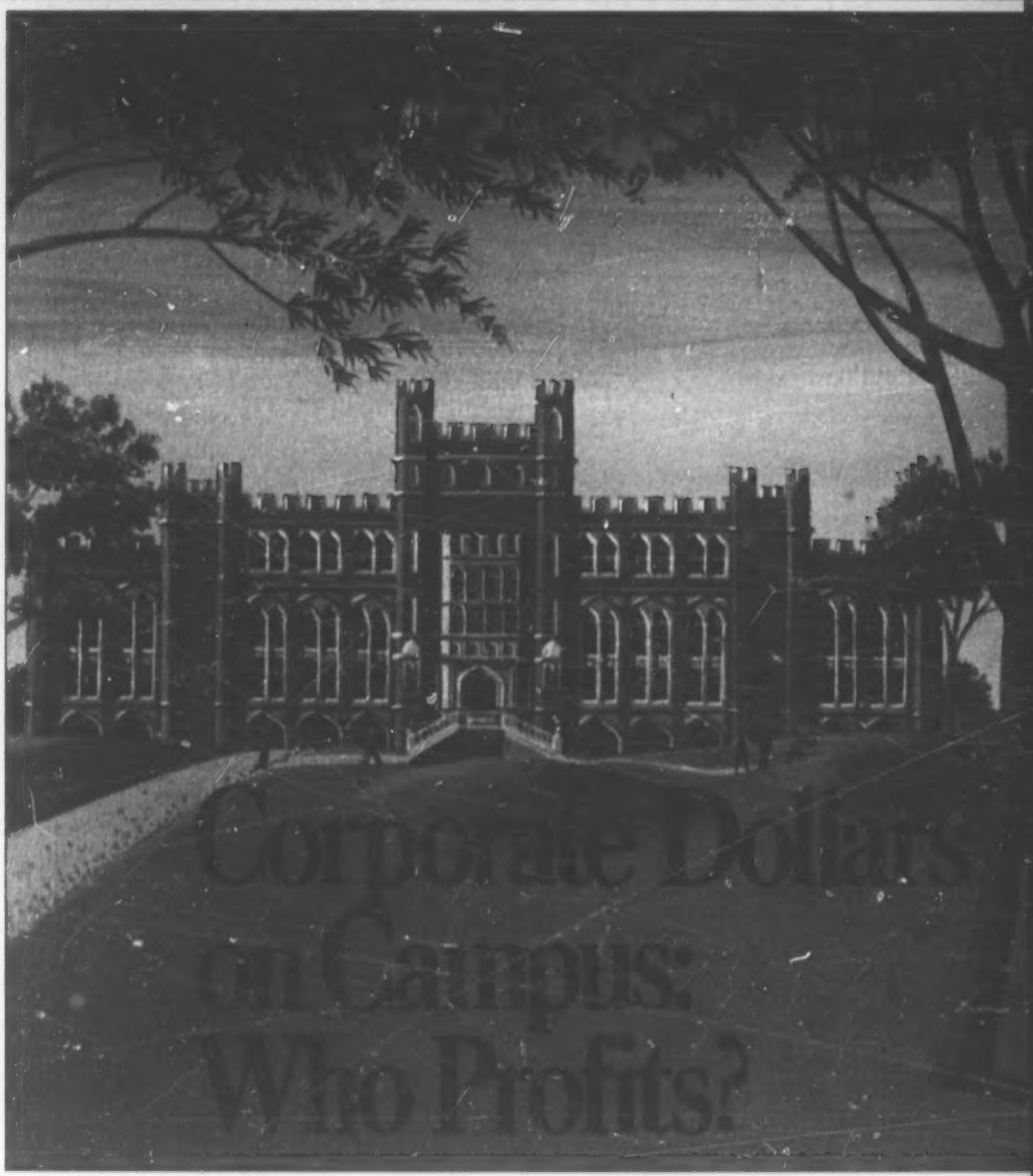
High-minded missions are being set in corporate MIS shops as well. John Singleton, chairman and president of Security Pacific Automation Co., Los Angeles, has heady goals for his MIS team: "We're not just cutting costs; we're generating profits."

When MIS can be brought to bear on the bottom line, or on a mission as critical as a nation's fleet readiness, there's no room in that sphere of responsibility for pointing fingers at vendors. The solution must be yours, and must be driven by your organizational mission.

The savvy MIS customer's search is no longer for a computer solution, it's for a business solution in which computers may play a part.

To succeed in making this the year of the customer, vendors must provide at least as great an understanding of the mission as of the machines. It's easier getting a network to work than it is getting a network to work towards accomplishing a mission. ■

REBECCA S. BARNA
EDITOR



Corporate Dollars on Campus: Who Profits?

In an era of declining profits and tight budgets, the amount of money spent by computer companies on university campuses in the name of both research and philanthropy continues to grow. While many firms regard these efforts as part of their regular research and development programs, others see them as a partial substitute for in-house research. Companies doling out donations generally expect to gain access to leading-edge development and researchers, enhance their own employee recruitment, and wean future customers on their products. Although it's true that some corporate spending on campuses contributes no measurable return to a company's bottom line, most businessmen and academics claim that expectations of mutual benefits are justified.

BY ED JOYCE

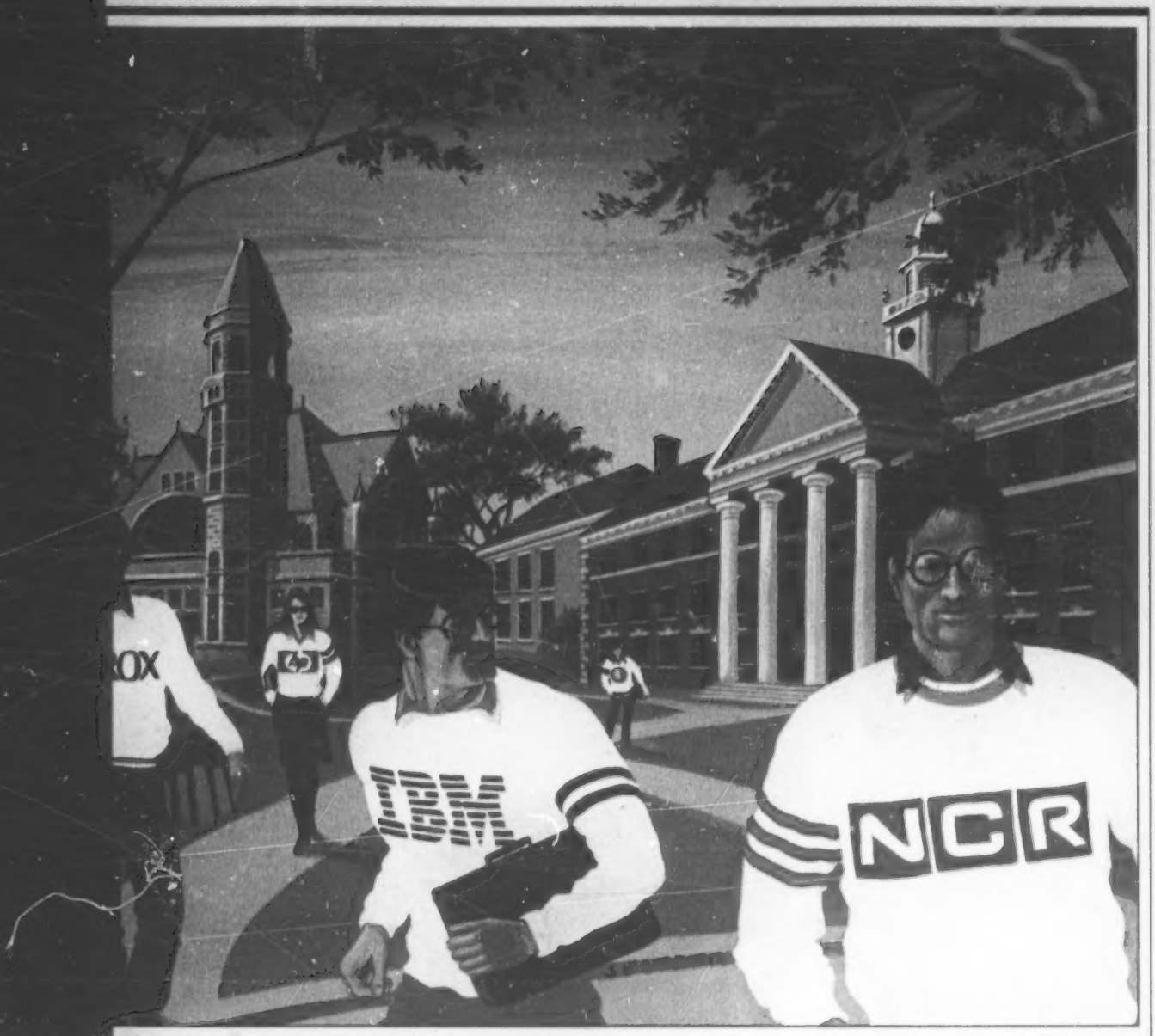
At first glance, it seems to be an unlikely match—AT&T providing support for genetic research at the University of Virginia (UVA). But the communications giant is doing just that through a multimillion-dollar donation of computer equipment to UVA's School of Medicine. The situation typifies much university computing today—if you're using a computer on campus, chances are you're benefiting from hardware and software donated, funded, or at least sold at a generous discount by a computer company.

The advantages of free mainframes and software for the academic community—whose beneficiaries range from elementary and secondary schools to universities and teaching hospitals—are largely self-evident, but what are the corporate sponsors getting out of these deals? Can they expect anything more than a major tax deduction and the noble feeling of supporting higher education?

Consider AT&T's donation to UVA: a $4.5 million gift of computer equipment and services, including an AT&T 3B5 minicomputer for the School of Medicine. Malcolm "Mitch" Smith, an assistant professor of microbiology at the Charlottesville, Va., university, relies on the 3B5 machine to research the regulation of gene expression and the recombination of DNA molecules. Smith freely admits that AT&T stands to gain nothing of direct value from his research.

Angie McGuire, AT&T's manager of university programs, explains that the company made the donation as part of a "philanthropic program to support higher education." The budget for AT&T's

Illustration by Isadore Seltzer



computer donation program has doubled since 1984, according to McGuire, and last year over 120 institutions benefited. Last year, when AT&T decided to eliminate 24,000 jobs from its Information Systems Division in a cost-cutting measure, the computer donation program gave away $68 million.

AT&T's program is by no means unique. "The interaction between high-technology companies and universities is growing dramatically," proclaims former IBM vice president Lewis Branscomb. IBM invested $71 million to support educational institutions in 1985, according to Branscomb. Until he retired a few months ago, Branscomb was responsible for guiding the company's scientific and technical programs, including philanthropic and research relationships with universities. In 1985, Big Blue had committed another $127.5 million in multiyear cooperative research contracts with 205 universities worldwide. At the start of this decade, IBM's university contracts amounted to less than $5 million.

"THERE'S NO SUBSTITUTE FOR BEING PART OF THE DESIGN PROCESS."

A survey of other computer firms shows corresponding levels of support for education. Digital Equipment Corp. donated about $5 million worth of equipment during its fiscal year 1986. Its contracts for university research in various multiyear projects currently total $20 million. Hewlett-Packard awarded $50 million in grants to universities and teaching hospitals in 1986. NCR doled out $3.9 million in equipment and cash grants in 1986, and allocated another $2 million for sponsored research. Thirty-two schools have received grants from Xerox, part of a three-year program established in 1984 with a $30 million budget.

Prime Computer Inc. handed out $9 million in university grants in 1986, while CDC spent $2 million.

The fact that university handouts survive and even thrive despite tight budgets suggests that the philanthropists have ulterior motives. For example, AT&T acknowledges a tax angle in its university giving program; the equipment at UVA was donated under the Economic Recovery Tax Act of 1981, which precludes it from being used for cooperative development projects between AT&T and the university. Furthermore, to qualify for the tax deduction, the donated hardware cannot be tied to marketing or sales efforts.

Even so, donated hardware itself can represent a sort of indirect marketing effort. As UVA's Smith points out, "When students leave the university for the working world, they may or may not demand AT&T equipment, but they will expect to find Unix [the 3B5's operating system]." As it happens, AT&T chooses recipient universities based on their commitment to Unix-based systems.

To appreciate other practical aspects of equipment grants, one must read between the lines of what company officials say about their donation programs. Part of the criteria determining a university's selection in the AT&T program, for example, involves what McGuire calls its "existing relationship with AT&T"—in other words, big customers.

Indeed, many companies seem to view philanthropy as a part of doing business in an increasingly vital market. Bob Trocchi, marketing manager of the education industry group at Digital, observes, "The academic computing market has been growing three times faster than the industry as a whole." If a school is willing to develop instructional software on DEC machines for a particular subject, such as chemistry, and make it generally available, then, Trocchi says, Digital will supply hardware through a donation or generous discount just to encourage that effort.

For their part, academic beneficiaries seem equally forthright about the motives behind corporate philanthropy. At Carnegie-Mellon University (CMU), Pittsburgh, IBM is funding $32 million worth of network development under Project Andrew, which CMU officials call "the most ambitious campus computerization project in the country." Project coordinator James Morris, the director of CMU's Information Technology Center, recognizes pragmatism in IBM's donations. "IBM sees the university market as a high-growth area," he says. "ACIS [IBM's Academic Information Systems division] is one of its fastest-growing business units. The policy of contributing equipment is part of a strategy of engaging the university to gain insight into the academic market."

Earning tax write-offs, getting students hooked on operating systems, and sweetening big customer orders with possible future donations of equipment may be sound business practice, but most companies defend their programs in more exalted—and hopeful—terms. "It's well known in this industry that you must spend a large percentage of your earnings on R&D," explains John McCredie, who directs external research programs in Digital's engineering division. "At DEC that figure was close to 11% in the last fiscal year, which ranks us tenth largest in R&D spending among the nation's corporations." McCredie oversees about 100 projects at 50 different universities where, in his words, "DEC barters equipment for research."

DEC's research activity, according to McCredie, is conducted in three main areas: in the company's internal laboratories; in joint ventures with other corporations; and in cooperative arrangements with university scientists.

"University programs comprise a small part of our overall strategy," admits McCredie, "but they allow us to keep abreast of the long-term horizon, the breakthroughs that may be five, 10, or 20 years away from the market." In his opinion, a development organization is "almost being irresponsible" if its research program excludes academia.

Taking the long view, then, the question remains, what do corporate sponsors really get out of funding campus research? Steven Lerman of MIT directs Project Athena, a joint venture begun in 1983 between his institution, IBM, and Digital. Lerman emphasizes that the support of IBM and Digital, which includes five salaried employees and $25 million in equipment and services over five years from each firm, is regarded as a gift to MIT. The corporate sponsors have no exclusive commercial rights to Athena. (By contrast, IBM's agreement with CMU on Project Andrew gives the company an exclusive option to develop and market a product; in fact, IBM antici-

The Cost of Sponsoring Research

Besides IBM and GM, the 30 sponsors of Carnegie-Mellon's Robotics Institute include Oberg Manufacturing, a Pittsburgh tool and die maker with just 300 employees. All R&D spending, says Oberg's director of engineering, Harry Walters, is like "casting bread on the water" to attract fish. "You can't see fish underwater. In reality there may not be any there, and your bread may just sink to the bottom, but you'll never know unless you try."

How much do companies have to pay to try? Here's the rundown on a few currently established university research centers that have attracted corporate sponsors.

INSTITUTION	CENTER NAME	ANNUAL DUES	MEMBERS
University of Virginia	Center for Computer Aided Engineering	$10,000	11
Pennsylvania State University	Center for Electronic and Acoustic Materials	$30,000	15
Stanford University	Center for Integrated Systems	$120,000 (plus initial fee of $750,000 for building construction)	20
Rensselaer Polytechnic Institute	Center for Manufacturing Productivity and Technology Transfer	$40,000 (annual fee waived for "founding" companies that initially invested $300,000 or more)	21
Carnegie-Mellon University	Robotics Institute	$15,000 to $50,000 depending on company size	30

pates distributing Andrew as an official product in the second half of this year.)

"Athena serves as a window into the future of computing," Lerman asserts, "a laboratory where you can come and observe a large-scale network in action. Our corporate affiliates want to know what types of products fit in this environment. For example, what are the best strategies for printers and displays?" Athena now ties together 300 workstations. The network is expected to grow to 1,500 workstations in 1988 and may eventually link 10,000 stations.

MIT researchers are expected to publish much of what they learn from Athena in technical papers. Since Athena will eventually be well documented in public sources, what do IBM and Digital stand to gain from their massive contributions? "Although people will learn about the project by reading publications and visiting the campus," states Lerman, "there's no substitute for being here every day and being part of the design process. That's the primary benefit for IBM and Digital."

Bottom-Line Benefits

Digital's McCredie suggests that having access to research results "two or three years before they get into the public domain" can bring bottom-line benefits to Athena's corporate sponsors. Digital already has tapped Athena technology for one product. The X-windowing system pioneered in Athena has been incorporated in the DEC VAXstation II/GPX Color Graphics Processor, which was announced in January 1986.

Since corporations can participate in university research centers for as little as a few thousand dollars a year, McCredie believes it is "a good business investment even for small companies." Compared with in-house R&D, contracted research incurs no significant startup costs in building construction or personnel staffing, and if business slows down, a company can immediately curtail research activity simply by cutting back on the funding, an alternative that, McCredie notes, is "far less painful than laying off a staff of research scientists."

How does a small company participate in such research, and what are the chances of payback? Needless to say, dozens of universities would be delighted to help potential sponsors answer the first question. According to the American Society of Engineering Educators, MIT—to pick one example—attracted about $10 million dollars in private-sector engineering support for the academic year 1984-85. Industry pays for 15% of all the research conducted at MIT, up from 5% a decade ago.

A Close Look at Some Centers

As for determining likely payback, it's instructive to take a close look at some "centers"—center being the form of organization that many universities have successfully used to court corporate funding. Take the case of Stanford University's Center for Integrated Systems (CIS). Established in 1983 with 20 leading industrial firms in microelectronics pledging to contribute $750,000 each for the construction of a building to house CIS, the center aims to "advance the state of knowledge by orders of magnitude." Additionally, the consortium members pay $120,000 annual dues for an inside track on CIS discoveries.

For their financial support, the corporate sponsors receive newsletters, reports, seminars, workshops, and consulting arrangements. The center has an

"IF YOU HAD TO JUSTIFY THE RETURN, YOU'D NEVER SPEND THE MONEY."

open-door policy for its sponsors, even encouraging them to place employees on-site to participate in CIS research. "Perhaps most important," says Stanford's president Donald Kennedy, "the sponsors have a chance to become acquainted with bright students, whose education we also hope to enrich through the center."

IBM's former vp Branscomb seconds that conviction. "Universities are invaluable to industry as a source of new knowledge, but the strongest ties result from the universities' roles as the sources of industry's future employees."

While CIS's membership roster resembles a ranking of the top 20 chip manufacturers in the country, other centers reflect a mix of large and small companies. The 30 sponsors of CMU's Robotics Institute, for example, range from IBM, Westinghouse, and General Motors to Pittsburgh tool and die maker Oberg Manufacturing Co., which boasts about 300 employees. The annual dues run from $15,000 to $50,000 depending on the size of the company. A sponsor will pay more to fund a project of particular interest.

In describing his firm's interest in the Robotics Institute, Harry Walters, director of engineering at Oberg, says, "The industrywide emphasis on automation and robotics motivated us to join the institute in 1982." He concedes that the investment in the Robotics Institute, like any R&D endeavor, can't be measured on a balance sheet. "If you had to justify the return on investment, you'd never spend the money," he declares.

Both academia and industry seem interested in justifying their partnership nonetheless. Last November, IBM convened a four-day "University Study" conference that attracted hundreds of university faculty members.

Typical of the conference's generally positive view on corporate-sponsored research was a talk given by Gary Kozak of IBM's Technical Personnel Development department. Kozak outlined the results of a study IBM commissioned on university-contracted research, which revealed that over 95% of the professors and 90% of the IBM employees sampled viewed their projects as being successful. More than 60% of the projects yielded results directly applicable or useful to IBM.

Despite such rosy pictures, some objections have surfaced as corporate funding has grown. Former IBM vp Branscomb acknowledges that "some critics of the university-industry connection are fearful of turning U.S. universities into product development laboratories," but, he says, "generally, we expect to see the work peer-reviewed and put into the public domain. IBM prides itself on its respect for academic freedom."

Overall, ties between industry and academia appear destined to grow. Experts believe such cooperation can aid the domestic economy by replenishing the reservoirs of basic discovery from which technological development flows. Still, U.S. companies may find the best indication of the value of industrial-academic cooperation by studying a familiar overseas competitor. Nearly every major Japanese corporation now sponsors research on one or more American campuses. ■

Ed Joyce is a writer based in Charlottesville, Va.